our knowledge of natural things and phenomena on the same assumption.

It will be recognized that whatever there may be of novelty in the above first principles is found in the combination rather than in any one element.

Finally I concede with the eminent philosophers of long ago that an idea of the real nature of "action at a distance" without any intervening medium is inconceivable to the human mind (*my* human mind—they no doubt likewise meant theirs) and especially so is the suggestion that an impulse which requires time for transmission from one body to another may have left the one and be on the way to the other—in a state of detachment between—with nothing but empty space along the road. (It is probable that the "velocity of light" as a physical constant is the same as the velocity of transmission of a gravitational impulse or change from one body of matter to another, or at least that there is some very direct relation beween the two.)

Here however is the parting of the ways. I have faith that it will some day be accepted that this inconceivableness is attributable, *not* to the fact that the suggestion is incompatible with the real workings of nature, but to the limitations in the powers of human comprehension.

If it can be accepted that "philosophy" is only a shorter term for peace of mind arrived at or approximated to after long pondering, then the above may be set down as a sort of personal philosophy of the writer's.

And the path of future progress? We are apt to regard the human intellect of our period as already in a stage of its development which may be called maturity, but this is not at all certain. If something like a curve is plotted to indicate the mental status of man at different periods or "ages"—the primitive state, the stone age, the bronze age, the age of iron, etc., its general shape will indicate whether the present is the age of finality in this respect. There was just as much reason for regarding any one of the previous ages as a culmination as there is for assuming that we are now on an ultimate crest of the curve of human powers of understanding. In fact if we consider the varying rate of change in direction of such a curve, or the rate of its departure from a base line of zero intelligence, there is less ground for thinking our present mental capacity is at a maximum than there was for such a belief at any previous age or period.

Let us therefore "play" that there *is* an ether, with all its seemingly necessary though improbable attributes, and go ahead with our observations, experiments, studies and researches until the mind of man, now possibly only in the juvenile or youthful stage of its growth, may have so far advanced towards maturity as to be able to put aside this elementary conception and to substitute something more grown up. Meanwhile let us not lose sight of this all-important coordinate part of the program for advancing—the development of the human mind in capacity for comprehension so it can assimilate and interpret the facts as they accumulate and keep pace with the general progress. The super intelligence capable of fully comprehending all nature will doubtless always remain a limiting ideal—something to be eternally striven for, to be approached all the while more nearly, but forever unattainable.

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SCIENTIFIC EVENTS

MANGANESE ORE IN GEORGIA

As manganese is urgently needed in the war several geologists of the United States Geological Survey, Department of the Interior, have been making systematic examinations of areas that are believed to contain deposits of manganese and manganiferous ores in the United States and the West Indies, in order to appraise our available resources of manganese and to assist in stimulating its production and use.

Manganese is a metal resembling iron. It is used principally in the manufacture of steel, to which it is added in the form of alloys with iron, such as ferromanganese and spiegeleisen. It is used also in glassmaking, in many chem-

ical industries, and in the manufacture of electric batteries. There are four commercial sources of manganese—manganese ores, manganiferous iron ores, manganiferous silver ores and manganiferous residuum from roasting zinc from an ore containing zinc, iron and manganese minerals. Under normal conditions the world's supply of manganese ore has come mainly from India, Brazil and Russia, but owing to the derangement of ocean transportation and of the foreign manganese industry only the deposits of Brazil are now available to the United States, and these can not be drawn upon freely because of the scarcity of ships and the long shipment.

The deposits of manganese ore in the Cartersville district, Ga., have recently been examined by Laurence LaForge, geologist of the United States Geological Survey, Department of the Interior, in cooperation with Mr. J. P. D. Hull, assistant state geologist of Georgia, and Professor W. R. Crane, of the United States Bureau of Mines. The ore deposits occur in a belt, 1 to 3 miles wide and 18 miles long, on the east side of the Coosa Valley, at the base of and on the western slopes of the hills that form the western margin of the Piedmont Plateau. This belt is in the eastern part of Bartow county, and the city of Cartersville is on its west side near its south end A branch of the Louisville & Nashville Railroad extends along the west side of the belt and spur tracks reach several of the larger mines. Iron ore, ocher and barite are also mined in this belt, and some of the mines produce two or more of these minerals.

The result of the examination is encouraging, for, although the district is an old one, the field studies of the geologists and the exploratory work of the mining companies have revealed the existence in it of large reserves of both high-grade manganese ore and manganiferous iron ore. In recent years little manganese ore has been mined in this district, but the necessity of the war and the curtailment of imports which have stimulated the production of domestic ore have caused a revival of mining there.

The workable manganese ores occur in part in vein and replacement deposits and in part in detrital deposits. The ores in the vein and replacement deposits are believed to have been deposited from surface water that carried in solution material leached from a considerable thickness of weathered rock, or, in places, from other older deposits of the same sort. The detrital deposits are scattered through a widespread thick surficial mantle of rock waste, wash and alluvium. The deposits of both types are extremely irregular in character and occurrence. They include both hard and soft ore and both pyrolusite and psilomelane, and perhaps manganite, though pyrolusite seems to be more abundant. Both types include large bodies of manganiferous limonite.

The vein and replacement deposits are found mainly in residual clay and fragments of rock derived by weathering from a siliceous limestone, or in a breccia made up chiefly of the shattered, weathered and somewhat displaced upper beds of quartzite that lies beneath the limestone. Some, however, are found at or near the base of the thick surficial blanket of rock waste and alluvium, in which detrital ores also occur. The manganese minerals occur as coatings on or as veins filling crevices in the quartzite; as irregular veins, sheets and pockets in both residual clay and alluvial material; and as stalactitic or mammillary concretions in the clay.

The hard rock that underlies most of the vein and replacement deposits is the Weisner quartzite, which was once overlain by the limestone that has been called the Beaver limestone, both Lower Cambrian formations. Beds of siliceous dolomite still remain, but nearly everywhere the soluble material of the limestone has been removed and nothing is left to indicate its former presence but a dense lumpy dark-red clay or masses of chert fragments in a red clay matrix. The strata have been sharply folded and have been displaced by many small thrust faults, so that the resulting structure is very complex.

The high-grade ore of the Cartersville district, as shown by the average of analyses of about 1,600 tons of material shipped within the last few months, contains about 42 per

cent. of manganese, 6 per cent. of iron, 6 per cent. of silica and 0.14 to 0.20 per cent. of phosphorus. The manganiferous iron ore of the district, as shown by the average of the analyses of about 300 tons shipped recently, contains about 15 per cent. of manganese, 20 per cent. of iron, 30 per cent. of insoluble material and 0.17 per cent. of phosphorus. Practically all the ore produced in the district is shipped to furnaces at Birmingham, Ala., for the manufacture of ferromanganese, spiegeleisen and manganiferous pig iron.

The irregularity of the occurrence of the ores, the complex geologic structure, and the scarcity of outcrops in much of the district make it extremely difficult to use the geologic conditions as a guide in exploration and development and hazardous to predict the probable occurrence of ore in any locality or to do much more than to guess at the reserves of ore. Fortunately, however, the district has been worked for many years, either for manganese ore or for other minerals, and has been rather thoroughly explored, so that there is some basis for an estimate of the reserves. The statement seems to be warranted that the district probably still contains at least 100,000 tons of minable high-grade manganese ore and perhaps 250,000 to 300,000 tons of manganiferous iron ore—sufficient to last for many years unless the rate of production is greatly increased.

BRITISH ELECTRICAL INDUSTRIES AFTER THE WAR

IN the general survey with which the report of the British Departmental Committee on the electrical trades is introduced, it is urged, as we learn from the *Journal* of the Society of Arts, that the national importance of those trades has never been realized either by the government or the general public. Through the achievements of Faraday, Wheatstone, Kelvin, Swan, Hopkinson, and many others, Great Britain was first in electrical enterprise, and should have retained her preeminence; but manufacturers were hampered while Parliament and local authorities debated how the distribution and use of electricity might be prevented from infringing "conventional conceptions of public privileges and vested interests." Consequently foreign manufacturers were enabled, both in their own and other markets to gain a hold which they have never lost. The approximate annual value before the war of the total products of electrical plant, mains, and appliances in this country and Germany is set out in the following table:

	Great Britain, £	Germany, £
Total electrical products.	22,500,000	60,000,000
Exports	7,500,000	15,000,000
Imports	2,933,000	631,000
Consumption of home-made machinery	15,000,000	45,000,000

Moreover, of the £22,500,000 manufactured here, a large proportion was produced by concerns under foreign control, and in the case of "British" exports a proportion consisted of foreign manufactures reshipped as British goods! Apart from legislative obstacles, Great Britain, it must be remembered, had attained much prosperity and technical efficiency in her use of steam, and therefore her manufacturers had less inducement than their rivals in foreign countries to adopt electrical driving. Another factor retarding our electrical progress has been the "strength of the gas interests." Again, foreign governments, appreciating the importance of conserving their home markets as a basis for the development of overseas trade, imposed protective duties and exerted influence on State Departments to purchase native goods. An industry cultivated under these and other encouraging conditions has had an immense advantage in international competition. There is, the committee says, conclusive evidence of the existence of German control over companies ostensibly British, and of that German control being exercised to the detriment of British interests indirectly through companies incorporated in America, Switzerland, and other neutral countries. "At the outbreak of war negotiations were in progress for the acquisition by Germany of financial control in existing companies of the United Kingdom, as well as in the British Dominions and India,